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Abstract
The main purpose of this thesis is to develop a servo motion controller for biped walking robot. First, the controller of the motor drive system is studied, and the motor using in the joint axle of AI-robot is adopted as a platform to evaluate the controller performance. The PD controller is designed as the position controller of the motor drive and the RS232 is adopted as the communication interface with external devices. Then, an AVR single chip controller produced by ATMEL Semiconductor Corporation is used to develop the position controller of the intelligent actuator in AI-robot.

The other key research of the thesis is to develop the central controller which is used in the pace motion of the biped walking robot. First, the forward and inverse kinematics, which is described by D-H （Denavit-Hartenberg）coordinated system, of the biped walking robot is derived. Then an FPGA （Field Programmable Gate Array）embedded a Nios II processor is adopted to implement the inverse kinematics and the pace motion of the biped walking robot. Finally, an AI-Robot used in this thesis will be used as the application platform to verify the feasibility of the proposed motion control technology for the biped walking robot.
Advisory Committee Ying-Shieh Kung - advisor

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